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Information Sheet

Canine Distempervirus (CDV)

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Distemper is a highly contagious viral infection caused by an enveloped, single stranded RNA virus of the genus *Morbillivirus*, family *Paramyxoviridae*.

Considerations in a shelter

Although greatly reduced by widespread vaccination, Canine Distemper continues to be a frustrating problem in some shelters. All too frequently, shelter dogs with green nasal and ocular discharge are misdiagnosed as distemper cases, when, most of the time, these signs are caused by various agents of canine kennel cough/upper respiratory infection. However, distemper does occur intermittently, especially in shelters located in communities with many unvaccinated dogs. Shelters need to protect their adoptable canine population from exposure to a dog with this potentially fatal illness and protect adopters from the heartache of bringing home a very sick dog, but also don't want to wrongly diagnose a serious disease in a dog that may only have a mild, treatable illness. Unfortunately, there is no simple and reliable method of diagnosing distemper in all infected dogs. Control of distemper requires a combination of effective quarantine, isolation, disease recognition/diagnostic testing, and environmental decontamination. An understanding of the natural history of the disease will help establish an effective preventive plan..

Susceptible host species

Canine distemper virus infects dogs and other mammals, including ferrets and raccoons. Dogs of all ages are susceptible if not previously immunized, although infection is most common in puppies between 12-16 weeks of age. Domestic cats are not at risk of distemper, although some large felids such as lions appear to be. (Feline panleukopenia, which sometimes is referred to as feline distemper, is not related to canine distemper). There is no demonstrated risk to humans from canine distemper. (Although at one time there was speculation that distemper might be associated with multiple sclerosis, studies over the last fifteen years have failed to support this connection [Appel, 1999].)

How is CDV Transmitted

Canine distemper virus is shed in all body secretions of acutely infected animals. It can be spread by direct contact or by aerosol or respiratory droplet exposure. Although the virus does not survive long in the environment, it can be transmitted by fomites such as hands, feet, or instruments over a short time/distance. Virus can be shed by subclinically or mildly infected animals; such animals probably play an important role in maintaining the virus in a chronically infected shelter population. Therefore, careful isolation of all dogs with upper respiratory signs *-always a good idea-* is especially important in a shelter where distemper is seen.

Environmental decontamination

Distemper survives no more than a few hours at room temperature. Cold and moist conditions increase survival, and it can last for several weeks at near freezing temperatures. The virus is readily inactivated by most commonly used disinfectants. Routine hygienic precautions are generally adequate to prevent spread

Incubation period

Usually 1-2 weeks from time of exposure to development of initial clinical signs, but can be as long as 4-5 weeks or even more. Occasionally neurological signs develop months after exposure in dogs that never showed initial signs of infection. Therefore, quarantine of dogs possibly exposed to distemper should be a minimum of one month, and even then it is impossible to be sure of catching all cases.

Disease course

Distemper virus can invade the respiratory, gastrointestinal, skin, immune and nervous systems. Consequently, signs are highly variable and disease course depends both on immune response and viral strain. Most commonly, early signs of clear to green nasal and ocular discharge, loss of appetite and depression are seen 1-2 weeks after infection, possibly followed by lower respiratory and gastrointestinal involvement. Neurological signs usually appear 1-3 weeks after recovery from GI and respiratory disease, but may develop at the same time or months later, even without a prior history of systemic signs.

Clinical Signs of CDV

Clinical signs of distemper are often unapparent or mild. If one dog in a shelter develops full blown disease, it is likely that there have been other, unrecognized cases in exposed dogs. Clinical signs of upper or lower respiratory infection and gastrointestinal disease are non-specific; a diagnosis of distemper should not be made based on these signs alone. Clinical signs more suggestive of distemper but seen with less frequency include neurological signs, ocular signs and dermatological signs. All distemper suspects should receive a careful eye exam.

Signs associated with dogs infected with canine distemper

Respiratory signs

- Nasal and ocular discharge
- Coughing
- Dyspnea (difficulty breathing)
- Pneumonia

Diagnostic value of respiratory signs: Upper respiratory signs alone are much more likely due to [kennel cough complex](#) than to distemper. Suspicion of distemper increases with progression to pneumonia, continued worsening of signs after > 2 weeks of treatment, or development of other signs listed below. However, pneumonia and GI signs accompanying upper respiratory infection in shelter dogs can have many other causes besides distemper.

Ocular signs

- Anterior uveitis (inflammation of the front chamber of the eye; may cause the cornea to appear cloudy and/or cause changes in the appearance of the virus.)
- Keratoconjunctivitis sicca (dry eye.)
- Optic neuritis (inflammation of the optic nerve-may cause sudden blindness.) Retinal degeneration or separation(may cause vision impairment.)

Diagnostic value of ocular signs: These signs are relatively uncommon, but when seen in conjunction with other systemic signs, greatly increase suspicion for distemper.

Gastrointestinal (GI) signs

- Anorexia (loss of appetite)
- Vomiting
- Dyspnea (difficulty breathing)
- Diarrhea (may be bloody)

Diagnostic value of gastrointestinal (GI) signs: Slightly increased suspicion for distemper when GI signs are seen in conjunction with URI in a dog with consistent age and exposure history. However, other causes such as [Parvo](#), internal parasites, or antibiotic reaction should be considered. Suspicion increases when severe GI signs occur in conjunction with respiratory signs and these signs persist greater than 1 week.

Neurological signs

- May occur in dogs with no or mild history of other signs.
- Usually occur within 1-3 weeks after systemic signs, but may occur at the same time or weeks to months later.
- Highly variable
- May include seizures (focal or generalized), weakness or paralysis, vestibular signs (loss of balance), myoclonus (muscle twitching/involuntary contraction), hypersensitivity, neck pain/rigidity, or behavioral changes.

Diagnostic value of neurological signs: In the absence of a history of trauma, appearance of neurological signs in a young dog with a high risk history (unvaccinated or incompletely vaccinated, possible exposure) should be considered highly suspicious for distemper regardless of other clinical signs. Appearance of neurological signs in conjunction with other signs (respiratory, GI, skin, ocular) listed above is virtually diagnostic of distemper.

Dermatological signs

- Pustular dermatitis (skin rash - associated with a favorable prognosis).
- Nasal and digital hyperkeratosis (thickening of the nose and footpads - *associated with a poor prognosis and progression to neurological disease.*)

Diagnostic value of dermatological signs: Same as for ocular signs. Nasal and digital hyperkeratosis should be interpreted with caution, as chronic nasal discharge can cause mild proliferation of nasal tissue and contact with harsh disinfectants on kennel floors can cause mild footpad changes.

Clinical pathology findings

- Lymphopenia (decreased white blood cells) common in first week of infection.
- Thrombocytopenia (decreased platelets) possible but less common.
- Other non-specific changes depending on organ involvement and presence of secondary bacterial infection.

Diagnosis of CDV

immunofluorescence assay (IFA)

IFA: For inclusion bodies on conjunctival scrape, buffy coat, urine sediment, traumatic bladder catheterization, transtracheal wash, cerebrospinal fluid (with neurological signs)

Diagnostic value: Accuracy not affected by vaccination. Positive result very likely to be correct. Negative result does not rule out disease, as false negatives are very common. This test is most useful early in the course of disease. Buffy coat most likely to be positive very early in disease, sometimes before clinical signs appear. Conjunctival and genital (urine or bladder) samples may be positive in first 2-3 weeks of infection. Transtracheal washes may be positive for more than three weeks. Virus persists in central nervous system for at least 60 days.

Serology

IgM: Serum antibodies measured by ELISA.

Diagnostic value: False positive possible within 3 weeks of vaccination. Otherwise, positive result is a good indicator of distemper infection. IgM antibodies persist for about 5 - 12 weeks in natural disease. False negative results can occur in dogs that die acutely without developing an antibody response, and can also occur in sub-acutely or chronically infected dogs.

IgG: Serial titers on 2 serum samples taken two weeks apart to detect rising titers (single titer has little diagnostic value).

Diagnostic value: In a dog known to not have been vaccinated within the past month, rising titers are indicative of infection, and an increase of greater than four fold is indicative of infection even in a recently vaccinated dog. Less dramatic increases in IgG titer may be caused by infection or recent vaccination. False negatives are possible as with IgM.

PCR(polymerase chain reaction)

PCR (polymerase chain reaction): *Can detect virus in respiratory secretions, CSF, feces, urine (depending on localization of virus).*

Diagnostic value: False positives are possible within 1-2 weeks of vaccination. Otherwise, positive result is a good indicator of disease. However, negative result does not rule out distemper, especially when samples are obtained late in the course of disease when virus may no longer be shed.

Necropsy/histopathology

Necropsy/histopathology: Spleen, tonsil, lymph node, stomach, duodenum, bladder and brain should be submitted for examination by a pathologist in order to detect distemper, which can localize in many different tissues.

Diagnostic value: Distemper can be identified reliably on necropsy and histopathology by a qualified pathologist. If distemper is a concern and a definitive diagnosis has not been reached by other testing methods, a necropsy is a worthwhile investment in a dog believed to have died of the disease to establish whether or not distemper is present in the shelter.

Treatment of CDV

No specific treatment for distemper has been proven effective. Treatment consists of supportive care, and may include: fluid support; nutritional support and anti-emetic therapy for vomiting and prolonged anorexia; nebulization and coupage for pneumonia; and antibiotics for secondary bacterial infection. Vitamin B supplementation has been recommended, and vitamin A supplementation may be helpful early in the course of illness. Seizures may need to be controlled with anti-seizure medication, and a single dose of dexamethasone may be considered to attempt control of CNS edema. Anecdotally, hyperimmune serum early in the course of infection may be beneficial. Because many dogs with mild signs are never actually confirmed as having distemper versus kennel cough, assessing the true benefits of anecdotal treatment is often difficult.

The prognosis for long-term recovery in dogs with distemper limited to GI or respiratory disease is fair with good supportive care, although recovered dogs may have permanent damage to the mucociliary apparatus and remain more susceptible to respiratory infections. Adopters should be warned that neurological signs could develop up to 3 months after infection. The prognosis for dogs with worsening neurological signs is poor; even if dogs survive, neurological damage is often permanent.

Recovery

Shedding may persist for as long as 3 months in recovered dogs, although a shorter shedding period is more common. Recently recovered dogs should be kept separate from the general adoptable population until at least four weeks after resolution of clinical signs, and separated from puppies, unvaccinated or immunosuppressed dogs for a full 3 months following recovery.

If isolating recovered dogs for such prolonged periods is impractical, PCR testing can be used to assess whether dogs are continuing to shed detectable virus. Nasal and rectal swabs should be taken over a several

day period at least 2 weeks after recovery, and can be submitted as a pooled sample to reduce testing cost. If negative, the dog is most likely not shedding virus in significant quantities, and can be moved into the adoptable population or adopted into a home. CAUTION: this test has not been validated.

Managing CDV Suspects

Treating and managing dogs with canine upper respiratory infection of unknown cause- distemper not ruled out

- Isolate all sick dogs from general population.
- Prevent contact of sick dogs with one another to prevent swapping of multiple agents.
- Broad spectrum antibiotics if secondary bacterial infection is suspected based on signs of green ocular or nasal discharge.
- Consider three day course of antibiotic with good activity against *staphylococcus* to treat nasal discharge without allowing bacterial overgrowth to develop.
- Antibiotics with good activity against *Bordetella bronchiseptica* if bordetellosis is suspected (based on current or historical culture results or typical clinical signs).
- Antitussives as needed to control coughing.
- More aggressive diagnostics and therapy if signs of lower respiratory disease develop.